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ORIGINAL ARTICLE

Falls among pregnant women in Enugu, Southeast Nigeria

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Abstract

Background: Falls during pregnancy are major public health issues and a common cause of maternal injury during pregnancy. There is paucity of data on prevalence and risk factors of falls during pregnancy in African population including Nigeria.

Objective: To determine the prevalence and risk factors associated with falls during pregnancy in Enugu, Nigeria.

Materials and Methods: This was a cross-sectional study of 332 consecutive pregnant women presenting in labor for delivery at the University of Nigeria Teaching Hospital Enugu, Nigeria between 1st May and 31st December, 2012.

Results: The mean age of the women was 32.2 ± 2.7 (range: 20-42) years. One hundred and eight women (32.5%) reported falling at least once during the index pregnancy. Women aged ≤ 30 years had twofold risk of falling during pregnancy than women aged > 30 years [41.1% (69/168) vs. 23.8% (39/164); odds ratio (OR): 2.23; 95% confidence interval (CI): 1.39-3.58; $P < 0.001$)]. Similarly, women ≥ 160 cm in height had significantly higher risk of falling during pregnancy than women < 160 cm in height [43.5% (70/161) vs. 22.2% (38/171); OR: 0.37; 95% CI: 0.23-0.60; $P < 0.0001$)]. Furthermore, primigravidae had almost threefold risk of falling during pregnancy than multigravidae [45.3% (63/139) vs. 23.3% (45/193); OR: 2.73; 95% CI: 1.70-4.37; $P < 0.0001$)].

Conclusion: Falls during pregnancy is common in Enugu, Nigeria. It is, therefore, recommended that women should be counseled during pregnancy on this public health problem and the above-identified risk factors emphasized in order to reduce the prevalence and morbidity.

Key words: Enugu, falls, Nigeria, pregnant women, prevalence, risk factors

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Introduction

Maternal falls during pregnancy are major public health issues and the most common cause of maternal injury during pregnancy.[1] It results from a combination of biological, behavioral, and environmental factors, many of which are preventable.[2] Information is generally lacking on the rate of falls during pregnancy in the general population.[3] However, Dunning *et al.*,[1] in their study in the United States of America reported an incidence of 27% during pregnancy, with 25% of the women falling two or more times during pregnancy. The protruding abdomen and loosening of pelvic ligaments cause a woman's center of gravity to shift and result in a progressive lordosis of the spine. These changes cause a woman to continually readjust her body alignment and balance, which result in a risk for falls and injury. It is obvious that postural stability declines during pregnancy and remains diminished at 6-8 weeks after delivery, thus it is risk factor for fall during pregnancy.[4,5] Several other risk factors have been identified to be associated with increased incidence of fall during pregnancy including advanced maternal age, occupation, walking on slippery floor, poor lighting, hurrying, or carrying an object and wearing high heel shoes. Change in the center of gravity that occurs in

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a pregnant woman as the pregnancy advances is associated with increased incidence of falls during pregnancy.[4]

Falls during pregnancy account for 17-39% of all traumatic injuries,[1,6-9] and trauma during pregnancy has been shown to be associated with an increased risk of fractures, sprains, head injury, spontaneous abortion, preterm labor, placental abruption, fetomaternal transfusion, and still birth.[1,6,10] There is paucity of data regarding falls during pregnancy in the African population. Consequently, information on the incidence, risk factors, and characteristics of falls during pregnancy are lacking in our environment thus making any preventive strategies very problematic. In order to address these problems, this study was designed to investigate the prevalence, risk factors, and characteristics of falls during pregnancy among women in Enugu, southeastern Nigeria.

Materials and Methods

Study area

Enugu state is one of the five states in the southeast geopolitical zone of Nigeria, and its capital city is Enugu. It lies within the West African rainforest region (latitude: 5°55' and 7°10' N and longitude: 6°50' and 7°55' E), through a land area of approximately 8,000 km^2. It has an average annual temperature of between 23.1°C and 31°C with a rainfall of 1520-2030 mm. The state covers a land area of approximately 8727.1 km^2. It has a mixed rural and urban population with the majority being Igbo with a population of about 464,514 inhabitants of which 52% are females.

The University of Nigeria teaching hospital (UNTH), Enugu is the pioneer teaching hospital in southeastern Nigeria. It is owned by the federal government of Nigeria and is currently located at Ituku-Ozalla, at the outskirts of Enugu. Further details of the study area and UNTH Enugu are as discussed in a recent study.[11]

Study design and sample selection

This was a cross-sectional study of consecutive pregnant women presenting in labor for delivery at the labor ward of the UNTH Enugu, Southeastern Nigeria. The study took place between 1st October and 31st December 2012.

Following individual counseling of eligible participants, self-administered, structured, and pretested questionnaires were distributed to the consenting selected women by trained medical interns. Ethical clearance for the study was obtained from the institutional review board of the UNTH, Enugu. Data sought included the sociodemographic characteristics of the respondents (age, marital status, tribe, level of education, occupation, parity, maternal height, and maternal weight), history of any falling incident (number of times you encountered fall during pregnancy, the gestational age at which it occurred, associated body injury, whether obstetrician was seen after the fall, any restriction after the fall), risk factors of falls, cause of the fall, other associated problems (home hazards, acute or chronic illness, and medications after the fall). Assuming a prevalence of 30% at a confidence level of 95%, and error margin of 5%, 332 study participants were eligible for the study. Statistical analysis was both descriptive and inferential at 95% confidence level using Statistical Package for Social Sciences (SPSS) computer software version 16 (SPSS Inc. Chicago, IL, USA). Frequency tables were generated for relevant variables. Continuous variables were analyzed using mean ± standard deviation and Student's *t*-test, while the discrete variables were analyzed using the Chi-square test. Relationships were expressed using odd ratio and confidence intervals (CIs). $P < 0.05$ was considered statistically significant.

Falls during pregnancy were defined as any loss of balance resulting in a fall, where a part or some parts of the body other than the feet touched the ground.[1]

Occupation was defined as any job done by someone to help earn a living such as civil service, trading, farming, and so on, while employment was defined as defined as "paid job" in which someone is paid some wages (salary) at specific intervals, for example, monthly.

Results

A total of 346 questionnaires were administered, but 332 were correctly filled, giving a response rate of 96.0%. The mean age of the respondents was 32.2 ± 2.7 (range: 20-42) years. Most of the women were married 311 (93.7%), while 8 (2.4%) were single. A total of 136 (41.0%) had secondary education, while 196 (59.0%) had tertiary education. None of the women had primary level of education. Primigravidae constituted 44.6% (n = 148) of the pregnant women, multigravid women 51.8% (n = 172), while the remaining 3.6% (n = 12) were grand multigravid women. Further details of the sociodemographic characteristics of the respondents are shown in Table 1.

Of the 332 respondents, 32.5% (108/332) reported falling at least once during pregnancy. Of the 108 women who experienced fall during pregnancy, 37% (40/108) fell two or more times, 29.6% (32/108) sought medical care, 13% (14/108) sustained injury, 9.3% (10/108) were admitted into the hospital for further management and had two or more days of restricted activity.

The incidence of falls was highest in the 21-30 years age group 56.5% (61/108), 161-170 cm height category 60.2% (65/108), primigravidae 49.1% (63/108), women with tertiary level of education 59.3% (64/108), women who are employed 74.1% (80/108), and in the third trimester 59.3 (64/108). Details of the pattern of falls during pregnancy are as shown in Table 2. Further analysis showed that women who are ≤ 30 years old have twofold risk of falling

Table 1: Participants' sociodemographic characteristics

Sociodemographic variables	Variable subgroup	Frequency	Percentage
Age group (years)	≤20	19	5.7
	21-30	149	44.9
	31-40	124	37.3
	41-50	40	12.1
Height (cm)	≤150	12	3.6
	151-160	159	47.9
	161-170	137	41.3
	>170	24	7.2
Marital status	Single	6	1.8
	Married	303	91.3
	Widowed	18	5.4
	Divorced	5	1.5
Gravidity	Primigravida	139	41.9
	Multigravida	144	43.3
	Grand multigravida	49	14.8
Level of education	Primary	0	0
	Secondary	136	41
	Tertiary	196	59
Occupation	Unemployed	85	25.6
	Employed	247	74.4

Table 2: Pattern of falls during pregnancy

Sociodemographic variables	Variable subgroup	Frequency of falls	Percentage
Age group (years)	≤20	8	7.4
	21-30	61	56.5
	31-40	32	29.6
	41-50	7	6.5
Height (cm)	≤150	4	3.7
	151-160	34	31.5
	161-170	65	60.2
	>170	5	4.6
Marital status	Single	0	0
	Married	105	97.2
	Widowed	2	1.9
	Divorced	1	0.9
Gravidity	Primigravida	63	49.1
	Multigravida	34	40.7
	Grand multigravida	11	10.2
Level of education	Primary	0	0
	Secondary	44	40.7
	Tertiary	64	59.3
Occupation	Unemployed	28	25.9
	Employed	80	74.1
Trimester when fall occurred	First	25	23.1
	Second	19	17.6
	Third	64	59.3

during pregnancy than women who are more than 30 years old [41.1% (69/168) vs. 23.8% (39/164); odds ratio (OR): 2.23; 95% CI: 1.39-3.58; $P < 0.001$)]. Similarly, women who are ≥ 160 cm in height have significantly higher risk of falling during pregnancy than women who are less than 160 cm in height [43.5% (70/161) vs. 22.2% (38/171); OR: 0.37; 95% CI: 0.23-0.60; $P < 0.0001$)]. Furthermore, primigravid women have almost threefold risk of falling during pregnancy than multigravid/grandmultigravid women [45.3% (63/139) vs. 23.3% (45/193); OR: 2.73; 95% CI: 1.70-4.37; $P < 0.0001$)]. However, the educational levels of the women and their employment status have no significant association with falling during pregnancy ($P < 0.05$). Details of the associations between falls during pregnancy and some maternal variables are as shown in Table 3.

Table 3: Associations between falls during pregnancy and some maternal characteristics

Variable	Variable subgroup	Falls in pregnancy		*P* value	Odd ratio (CI 95%)
		Yes	No		
Age (years)	<30	69 (41.1)	99 (58.9)	<0.001	2.23 (1.39, 3.58)
	>30	39 (23.8)	125 (76.2)		
Height (cm)	≤160>160	38 (22.2)	133 (77.8)	<0.0001	0.37 (0.23, 0.60)
		70 (43.5)	91 (56.5)		
Gravidity	Primigravida	63 (45.3)	76 (54.7)	<0.0001	2.73 (1.70, 4.37)
	Multi/grand multigravida	45 (23.3)	148 (76.7)		
Level of education	≤Secondary	44 (32.4)	92 (67.6)	0.95	0.99 (0.62, 1.57)
	Tertiary	64 (32.7)	132 (67.3)		
Occupation	Unemployed	28 (32.9)	57 (67.1)	0.93	1.03 (0.61, 1.73)
	Employed	80 (32.4)	167 (67.6)		

CI: Confidence interval

A total of 50% (54/108) of the women reported indoor activities as the cause of their falls during pregnancy, while 39.8% (43/108), 35.2% (38/108), and 35.2% (38/108) reported climbing staircase, slippery floor, and hurrying up respectively as causes of their falls during pregnancy. Other reported causes of falls during pregnancy by the women are as shown in Table 4.

Discussion

This study has demonstrated that the prevalence of falls among pregnant women in Enugu, Nigeria is 32.5%. This result is very similar to reports from USA[1] (27%), Turkey[12] (31.9%), and Brazil[13] (27.6%). The high incidence of fall recorded in this study implies that this often neglected public health issue is highly prevalent in our environment with consequent adverse effects on maternal health. The adverse impact of falling during pregnancy on maternal health is further corroborated in this study by the finding that as much as 18.5% and 13.0% of the women who reported falling during pregnancy required hospital admission and sustained injury, respectively. Furthermore, the women who were admitted had restricted movement for at least 2 days with possible impact on the psychological

Table 4: Distribution of various causative factors for falls during pregnancy (n = 108)

Causative factors	Frequency	Percentage
Indoor activities	54	50.0
Climbing staircase	43	39.8
Slippery floor	38	35.2
Hurrying up	38	35.2
Uneven ground	32	29.6
Carrying object or child	32	29.6
Water on the floor	22	20.4
Poor lightening	16	14.8
Obstructed view	11	19.2
Pushed/truck on purpose	9	8.3
Cluttered area	5	4.6
Getting up/down	5	4.6
Pushed/struck by accident	3	2.8
Bath tub/shower	2	1.9

and social well being of the affected women. These falls no doubt caused further increases in obstetrical costs in an environment, where payment of maternal health services is almost entirely out of the pocket.[14] It was found in this study that women aged 30 years and below have twofold risk of falling in pregnancy than those more than 30 years of age. This highly significant risk factor may be explained by the fact that younger women are likely to be more active and thus more likely to be engaged in activities that could predispose them to falling during pregnancy. This assumed higher activity among the younger age group may also explain the obtained significant higher risk of falling among the primigravid women than the multigravid/grandmultigravid women. In fact, primigravid women have threefold higher risk of falling during pregnancy than multigravid/grandmultigravid women. These findings are similar to reports from previous related studies.[1,15] Similarly, women who are more than 160 cm in height are significantly at higher risk of fall during pregnancy. This may be explained by the inevitable instability that occurs during pregnancy resulting from changes in the center of gravity which is more in taller women. It was also observed in this study that most of these falls occurred during third trimester and this may be due to increasing physiological lordosis and consequent increases in center of gravity and consequently maternal instability as pregnancy advances. The etiological (causative) factors for falling during pregnancy such as slippery floors, wearing inappropriate shoes, carrying additional loads, poor lighting, hurrying, and having obstructed views as observed in this study are similar to findings from previous related reports.[4,16]

The major limitation of this study is the fact that it is a hospital-based study which calls for caution in generalizing the findings to the entire population. Furthermore, the reportage of events was done retrospectively with likelihood of recall bias. Despite these limitations, the study has initiated the process of filling the existing gap on falls during pregnancy and the risk factors in our environment.

Conclusion

The prevalence of falls during pregnancy is high in Enugu, Nigeria. The risk factors associated with falls during pregnancy in the population included younger age of less than 30 years, primigravidity, and maternal height of more than 160 cm. It is, therefore, recommended that women should be counseled during pregnancy on this public health problem and the above-risk factors emphasized together with the identified causative factors.

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